MDT 20

VIDEO DISPLAY TERMINAL

TRAINING PROGRAM

SBXMDT030

Table of Content
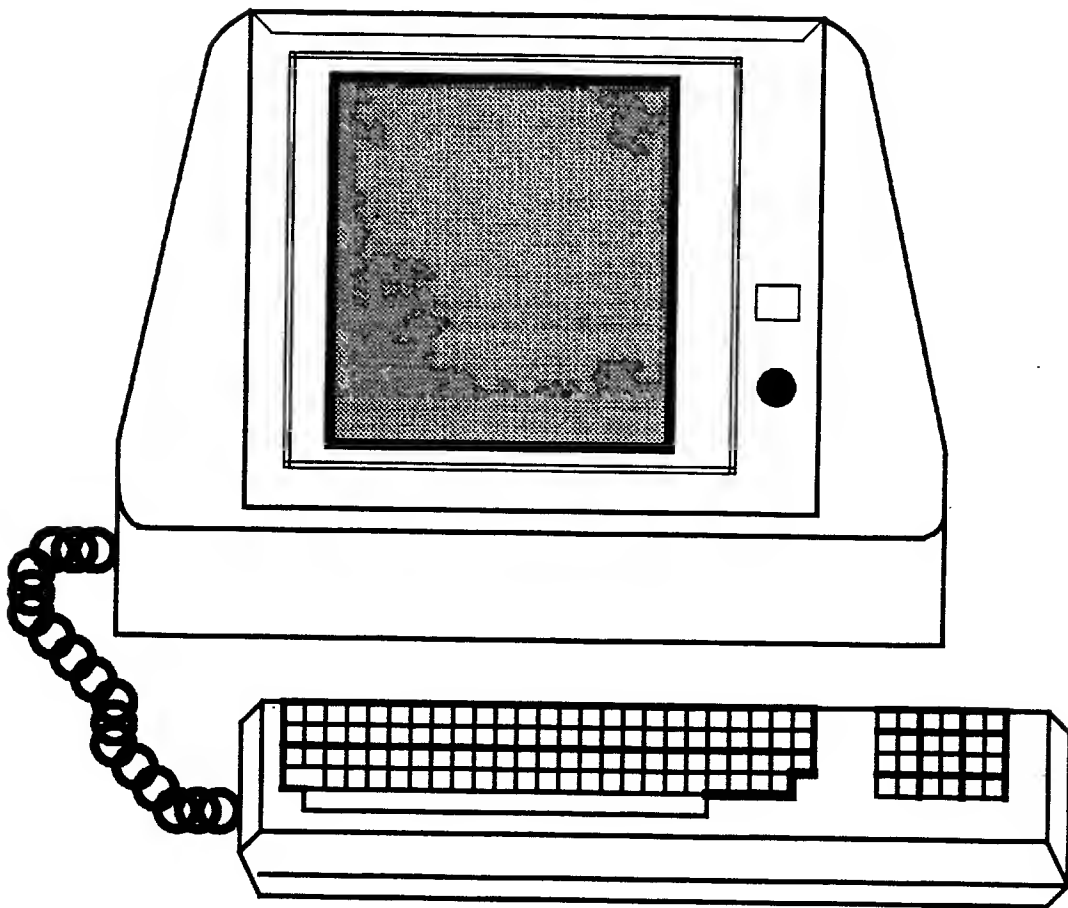
MDT 20
Video Display
Terminal Training Program

MODULE 1
INTRODUCTION

MODULE OVERVIEW

The purpose of this module is to familiarize you with the MDT 20 Video Display Training Program and the MDT 20 Video Display Terminal. This module has been divided into two sections:

Section I   Program Introduction

Section II   Terminal Introduction

PREREQUISITE MODULE

NONE

PREREQUISITE TRAINING

GENERIC MICROCOMPUTERS TRAINING PROGRAM or EQUIVALENT TRAINING

MODULE OBJECTIVE

Using the MDT 20 Video Display Terminal Training program and **REQUIRED RESOURCES**, answer with 80% accuracy, a series of questions relating to the training program format, and specifications of the MDT 20 Video Display Terminal.

ESTIMATED TIME TO COMPLETE

1.0 Hour

REQUIRED RESOURCES

MDT 20 VIDEO DISPLAY TERMINAL SERVICE MANUAL

MDT 20 SERVICE MANUAL SUPPLEMENT

SECTION I
PROGRAM INTRODUCTION

The MDT 20 Video Display Terminal Training Program that you are starting is a self paced learning program. The format is the same have you used in other XSB Training Programs. For this reason, only the major points of this program will be reviewed here.

At the beginning of every module you will find a page containing the Module Overview, Module Prerequisites, Module Objective, Estimated Time to Complete, and the Required Resources. If there are Additional References available, they will be listed last. Additional References are those that may assist you in understanding a particular point or may present the material from a different point of view (i.e., Operator's Manual). It will benefit you to carefully check these items listed on the first page of the module prior to starting the module.

Required Resources will list resources unique to the module, however there are resources assumed to be available such as Tools and Training Program. An MDT 20 Video Display Terminal is not required to complete this training program. Estimated Time is the average time it may take you to complete the module. The Module Objective is a statement that tells you exactly what must be done, what you may use while doing it, and how you will be measured in order to demonstrate your competence. Since you will be tested on the objective, it is important that you be aware of the objective as you work through the module. The module test will verify your ability to meet the module objective.

The Module Prerequisites states all prerequisites that must be completed before starting the module and the Module Overview gives you an idea of what you will be doing in the module.

At the end of each module you will find a test. This test may be taken after you have completed the module and reviewed any material that you feel needed reviewing. Because this program is re-useable, you will be instructed to write your module test answers on a blank sheet of paper. Do not write in this program. The feedback sheet with answers can be found in the back of the program.

Remember, this training progam is self-paced and does not require adminstration of a "course monitor". Follow all directions to complete each module.

SECTION II
TERMINAL INTRODUCTION

MDT 20 VIDEO DISPLAY TERMINAL

The Morrow Designs MDT 20 Video Display Terminal is a customized version of the Lear Siegler ADM22 Video Display Terminal. The MDT 20 Terminal is a two-piece modular design terminal, that includes a monitor assembly and a keyboard assembly. The monitor has a 12 inch diagonal non-glare display with full 128 ASCII character set, in an 80 column by 24- row format. To enhance visual performance, four visual attributes are available. They are blink, reduce, reverse, and underline.
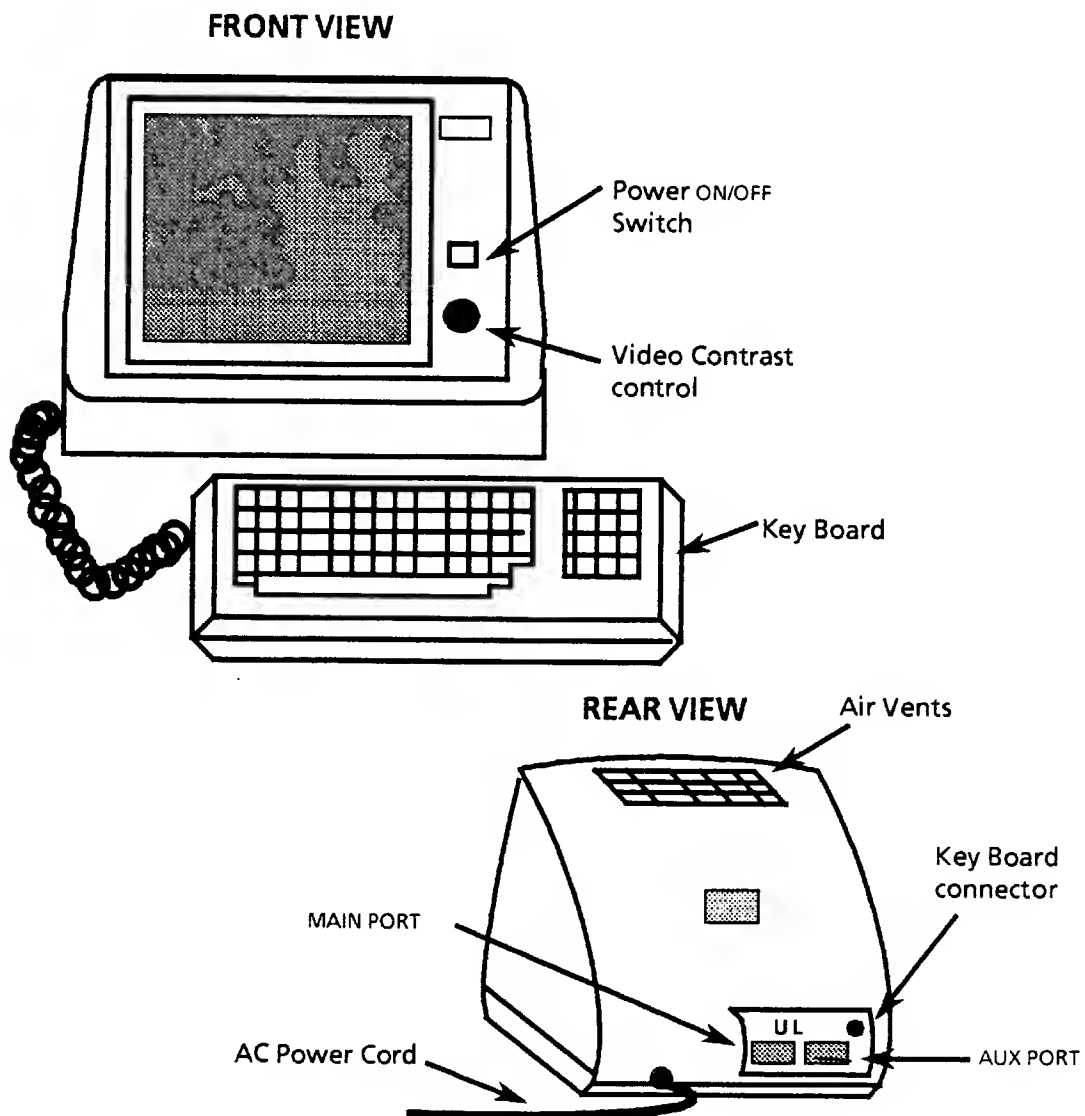
FRONT VIEW

Power ON/OFF Switch

Video Contrast control

Key Board

REAR VIEW Air Vents

Key Board connector

MAIN PORT

U L

AC Power Cord

AUX PORT

Figure 1-1 Front and Rear View of MDT 20 Video Display Terminal

INTRODUCTION

The monitor assembly contains the Main Logic PWB, the Monitor Control PWB's, CRT and associated circuit, Regulated Power Supply, and Transformer Assembly. Refer to figure 1-2 as you read the following.

Main Logic PWB, located in the bottom and to the right of the CRT, contains the microprocessor and various intergrated circuits which control the operation of the MDT 20 Video Display Terminal. The microprocessor receives data sent to the terminal, decodes the data, and reformats it into data and control instructions for the Video logic and other intergrated circuits within the Main Logic PWB. Also located on the Main Logic PWB are the I/O interface ports.

Monitor Control PWB, mounted to the left side of the front frame, and **CRT PWB**, mounted to the CRT, provides the circuitry and high voltage needed to drive the CRT. The Flyback Transformer, Brightness, Focus, Vertical Size and Hold controls are located on the Monitor Control PWB.
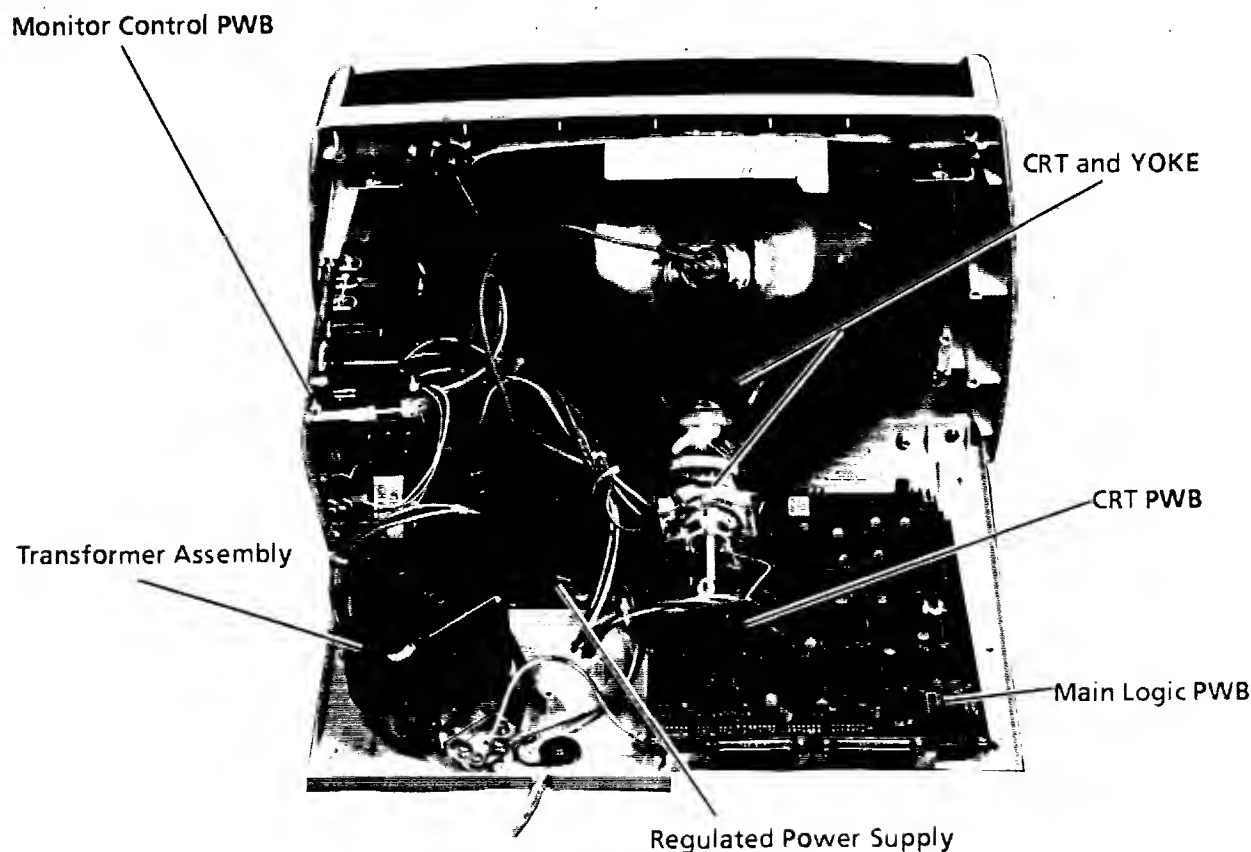

Figure 1-2 MDT 20 Video Display Terminal (Cover removed)

Regulated Power Supply and Transformer Assembly, located in the rear and left of the CRT, accepts line voltage inputs of 115 VAC or 230 VAC (with 230 volt Power Supply Option installed) and provides + 5, + 15, and -12 VDC to the Main Logic PWB, Monitor Logic PWB, and Keyboard Assembly. All output voltage levels are self regulating and are not adjustable. Whenever an output voltage falls outside of its tolerance, the Power Supply should be replaced.

CRT and Yoke, mounted to the front frame of the display, provides the video display.

Power ON/OFF switch and Video Contrast control are located on the front of the monitor for user convenience. At the rear of the housing are the Interface connectors, Keyboard connector, and AC power cord. Refer to figure 1-1.

Figure 1-3 Keyboard Assembly (Cover removed)
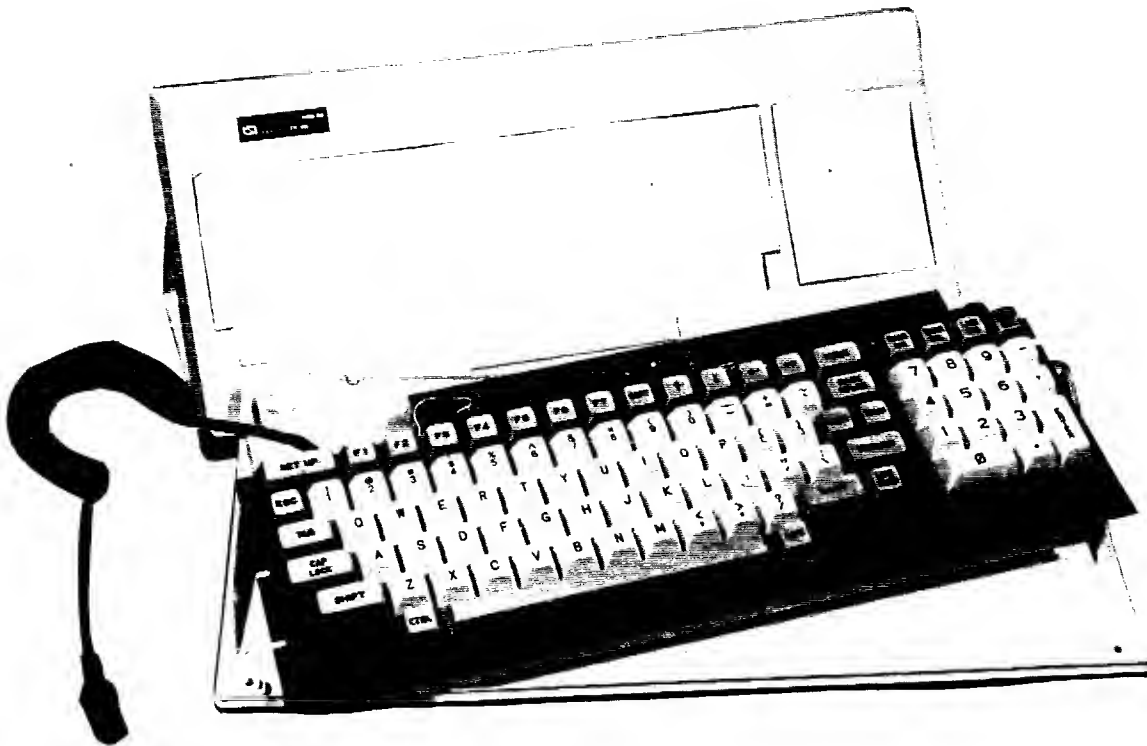
The Keyboard assembly consist of a 92-key keyboard, associated logic, and six-foot coiled cord that connects the keyboard to the monitor assembly. The 92-key total includes a fourteen key numeric keypad, separate cursor control keys, and seven function keys. Both assemblies are packaged in lightweight, compact housings that provide flexibility and convenience in operation.

INTRODUCTION

There are numerous applications of the MDT 20 Terminal, all involving the transfer of data to and from computers. Data transfer in some applications may be almost exclusively undirectional, such as from the terminal to the computer. A frequent application is one in which you communicate with a computer, and the computer responds in accordance with its stored program. Using the keyboard, information may be entered in one of two modes, Conversation mode or Block mode. Most applications of the MDT 20 Terminal will be used in the conversation mode.

SPECIFICATIONS

MDT 20 Terminal general specifications are listed below. Refer to section I General Description, Table 1-1 of the MDT 20 Video Display Terminal Service Manual and review specifications.

DIMENSIONS:

Monitor		Keyboard	
Width	16.5 inches	Weight	2.8 inches
Height	12.2 inches	Depth	7.5 inches
Depth	14.6 inches		
Net Weight	24.2 pounds		

POWER:

Input	AC 120 Volts / 60 Hz interchangeable to AC 230 Volts / 50Hz
	Consumption 50 Watts

OPERATING
ENVIRONMENT:

Temperature	Operating:	10° C to 40° C (41° F to 104° F)
	Storage:	-15° C to 65° C (5° F to 150° F)
Humidity	10% to 85% without condensation	

This completes Module 1 Introduction. If you feel comfortable with the material presented in this module, proceed to the Module Test located at the end of this module. If you require additional information, refer to the MDT 20 Video Display Terminal Service Manual.

MODULE TEST
INTRODUCTION

Answer the following questions on a blank sheet of paper. Do not write in this manual. When you are finished, verify your answers with the feedback sheet located in the back of this manual.

1.   What does the Module Objective state?

2.   What must be completed before starting a module?

3.   Information that assists you in understanding a particular point or presents the same material from a different point of view is called _____   _____?

4.   What two modes of data tansmission can be used to transmit data to the computer?

5.   What is the size of the display?

6.   What components are located inside the monitor?

MODULE 2
INSTALLATION

MODULE OVERVIEW

The purpose of this module is to familiarize you with the installation procedures of the MDT 20 Video Display Terminal. This module is divided into two sections:

Section I   Initial Inspection

Section II   Initial Preparation

PREREQUISITE MODULE

MODULE 1, INTRODUCTION

MODULE OBJECTIVE

Using the MDT 20 Terminal Training Program and **REQUIRED RESOURCES,** answer with 80% accuracy, a series of questions relating to the installation of the MDT 20 Video Display Terminal.

## ESTIMATED TIME TO COMPLETE

1.0 Hour

REQUIRED RESOURCES

MDT 20 VIDEO DISPLAY SERVICE MANUAL

MDT 20 SERVICE MANUAL SUPPLEMENT

SECTION I
INITIAL INSPECTION

The installation of the MDT 20 Video Display Terminal is a fairly easy task to accomplish. First the package is inspected for transit damage. The terminal is removed from its packing and checked for physical damage. If no damage is observed then installation begins by verifying site requirements. The MDT 20 Terminal may be conveniently installed in a normal office environment. No special mounting provisions are required. Voltage requirements are specified on the purchase order and the terminal should be configured at manufacturing for 115 volt or 230 volt AC.

MDT 20
Video
Display
Terminal
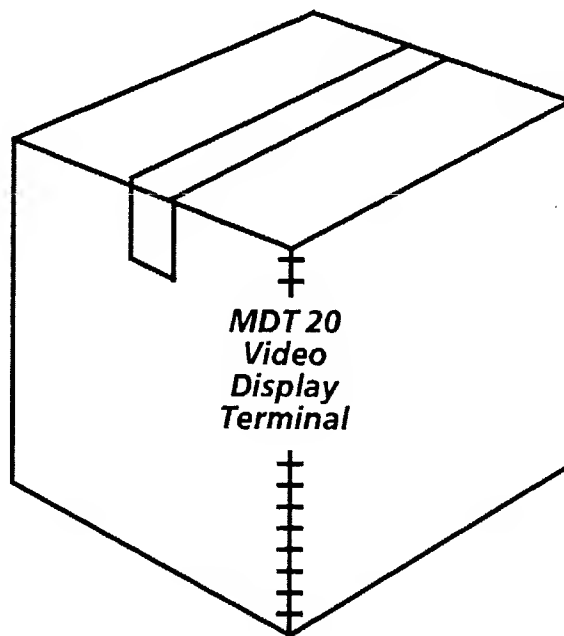
CAUTION

Whenever the MDT 20 Terminal is physically moved from a cold location to a warmer environment, be sure to allow sufficient time for the equipment temperature to equalize with the warmer location before activating the unit. Condensation developed by the tempature differential could impair the terminal.

SECTION II
INITIAL PREPARATION

VERIFY VOLTAGE AT WALL RECEPTACLE

Before connecting terminal to the wall receptacle, measure and verify the available voltage. Perform procedures listed below:

    A.   Move meter RANGE switch to 150 VAC scale.

    B.   Measure voltage between AC line (ACH) and neutral (ACN).

    C.   Verify that meter reading is between 103 VAC and 127 VAC.

    D.   Measure voltage between ACH and ground (GND).

    E.   Verify that meter reading is between 103 VAC and 127 VAC.

    F.   Measure voltage between GND and ACN.

    G.   Verify that meter reading is less than 3 VAC.

NOTE: AC Line slot may be the same size as AC Neutral slot on older style wall receptacles.
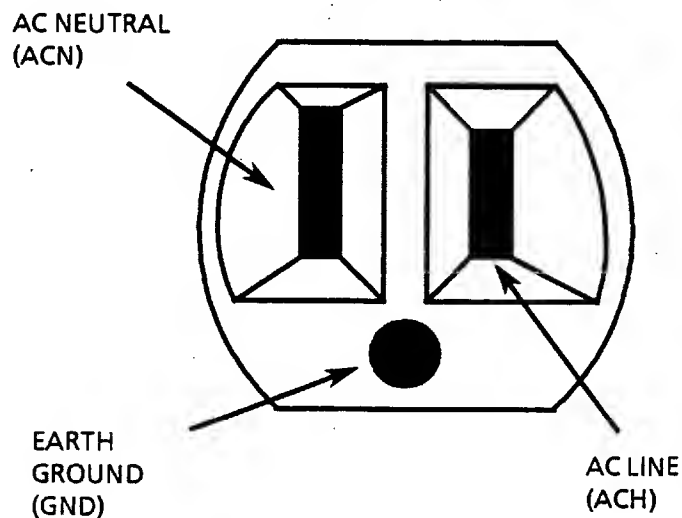

Figure 2-1 115 Volt Wall Receptacle

CAUTION

If any of the voltage requirements are not as specified above, the cause must be corrected. Inform the customer that the equipment must not be connected to the wall receptacle, and that a licensed electrician must correct the wiring. Do not try to make the correction yourself.

Figure 2-2 MDT 20 Video Display Terminal

SET-UP MODE FEATURES

Once line voltage verification is completed the terminal is ready for operation. Next, the operating characteristics of the MDT 20 Terminal are selected. The operating characteristics of the MDT 20 Terminal are controlled by firmware "switches"that are displayed on the status line when the SET-UP key is pressed.The operating characteristics include such functions as baud rate, parity enable/disable/even/odd, and visual attributes (reverse video). Refer to Figure 2-3 Terminal Set-Up Mode Display and Table 2-1 Status Line and Recommended Set Up in section 2 of the MDT 20 Terminal Service Manual.
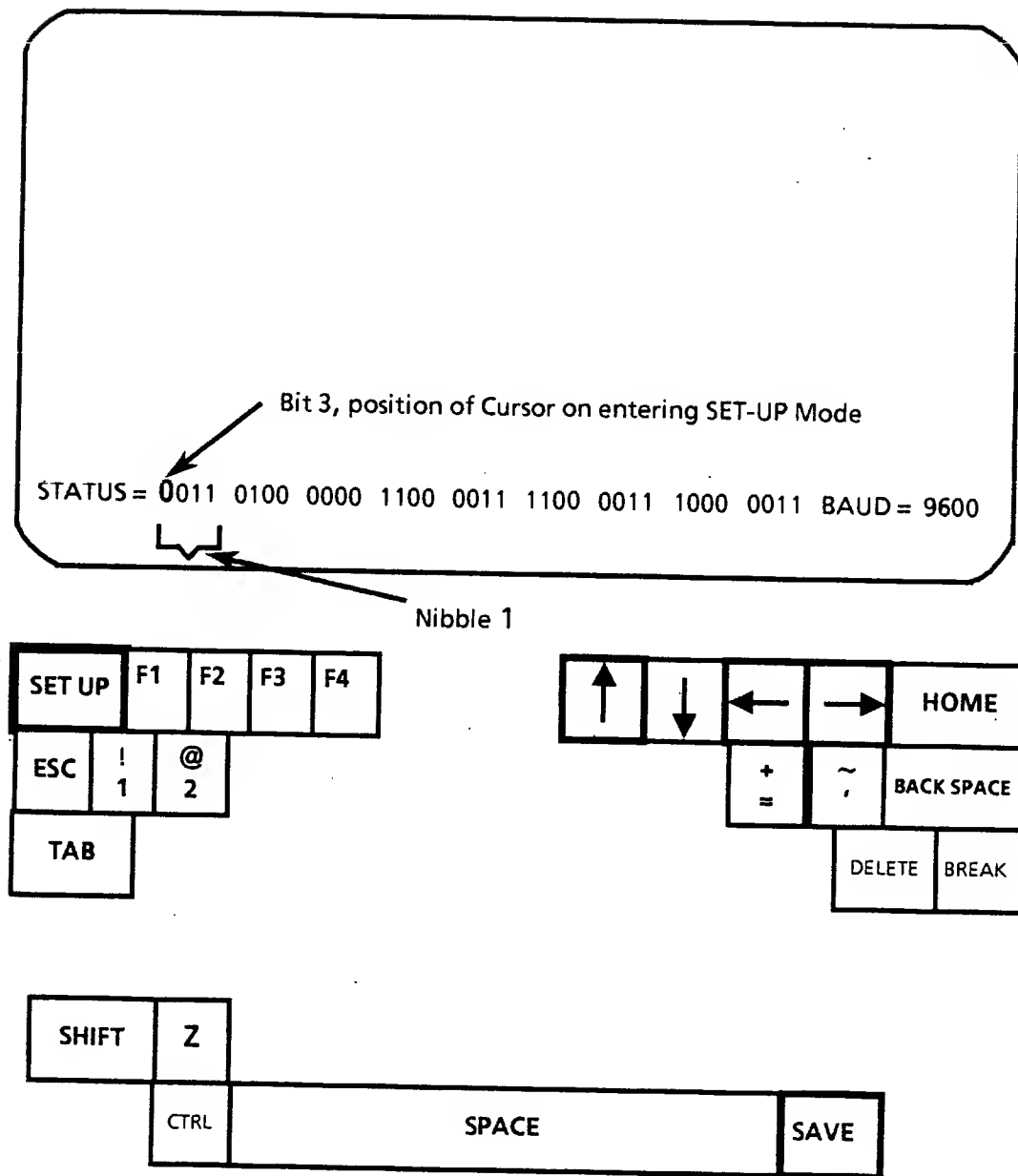
Figure 2-3 Terminal Set-UP Mode Display and Associated Keys

Set-Up Mode is entered by pressing the SET-UP key located in the upper left hand corner of the keyboard. When Set-Up Mode is entered the display will scroll up one line and present the 25th line, which is the Status Line. The SAVE key, SET-UP key, and ARROW UP, ARROW RIGHT, and ARROW LEFT keys are the only valid keys in this mode. Any invalid keystroke will sound the audible alarm and the character will be ignored.

INSTALLATION

The MDT 20 Terminal also transmits a X-OFF code to the computer when Set-Up Mode is entered providing the terminal is on-line and the X-ON/X-OFF protocol was enabled. When Set-Up Mode is exited the display will scroll down one line and the terminal will transmit an X-ON code to the computer.

NOTE
Changing communications characteristics when in Set-Up Mode may affect
or prevent further data transfer with the computer or auxiliary device.

The cursor is positioned at bit 3 nibble 1 when Set-Up Mode is entered. Refer to figure 2-3 in the training program and Table 2-1 of the MDT 20 Video Display Terminal Service Manual. Selecting functions to be changed is accomplished by moving the cursor to the bit to be changed and changing that bit to a "1" or "0". Cursor movement is controlled by the **ARROW LEFT** and **ARROW RIGHT** cursor control keys. When the cursor is positioned over the desired bit, pressing the **ARROW UP** key will alternately select "1" or "0" for that function. To change the baud rate, the procedure required is to move the cursor over the " = " next to BAUD and select the desired baud rate by pressing the **UP ARROW** key.

Exiting the Set-Up Mode is done by pressing the SET-UP key a second time or the SAVE key. All functions that were selected or changed, take affect once Set-Up Mode is exit. The selected or changed functions can be stored in one of two types of memory. When pressing the SET-UP key to exit Set-Up Mode, the functions selected or changed are stored in "working" volatile memory. Volatile, meaning that this memory will be lost if the terminal is powered down. To save the set -up functions in non-volatile memory, the SAVE key must be pressed to exit the Set-Up Mode. The MDT 20 Video Display Terminal will always power-up with the last saved set-up condition.

INTERFACE
The MDT 20 Terminal provides two ports, J1 and J2, to interface directly or via telephone data lines with a local computer and serial printer, or other auxiliary device. The Main Port Interface (J1) provides standard RS-232C interface requirements. The Auxiliary Port Interface (J2) provides receive only (RO) interface to a serial printer or other RO device.

Installation is completed when proper voltage requirements are verified, data interface cable(s) is connect to the terminal using the appropriate interface port, set-up functions to establish desired operating parameters of the MDT 20 terminal are selected and saved, and with power applied, the cursor appears in the Home position (upper left hand corner) and the terminal's audible alarm is heard.

This completes Module 2 Installation. If you feel comfortable with the material presented in this module, proceed to the Module Test located at the end of this module. If you require additional information, refer to the MDT 20 Video Display Terminal Service Manual.

MODULE TEST

INSTALLATION

Answer the following questions on a blank sheet of paper. Do not write in this manual. When you are finished, verify your answers with the feedback sheet located in the back of this manual.

1.   What type of mounting does the MDT 20 Video Display Terminal require?

2.   What events are displayed on the MDT 20 Terminal when the SET-UP key is pressed?

3.   List the types of memory that are used to store the set-up functions.

4.   Which interface port on the MDT 20 Terminal supports a Serial Printer?

5.   Where is the cursor placed when changing baud rate?

6.   What key or keys allows the MDT 20 Terminal to exit Set-Up Mode?

MODULE 3
OPERATION

MODULE OVERVIEW

The purpose of this module is to familiarize you with the operation of the MDT 20 Video Display Terminal. This module will discuss the Operational Modes, Keyboard Operation, Data Transmission, Display Attributes, Print Operations and Self Test.

PREREQUISITE MODULE

MODULE 2, INSTALLATION

MODULE OBJECTIVE

Using the MDT 20 Video Display Terminal Training program and **REQUIRED RESOURCES**, answer with 80% accuracy, a series of questions relating to the operation of the MDT 20 Video Display Terminal.

ESTIMATED TIME TO COMPLETE

1.0 Hour

REQUIRED RESOURCES

MDT 20 VIDEO DISPLAY TERMINAL SERVICE MANUAL
MDT 20 SERVICE MANUAL SUPPLEMENT

OPERATION

OPERATIONAL MODES

The MDT 20 Video Display Terminal provides several different modes of operation. When the mode of operation changes, the operating characteristics of the terminal changes. One mode of operation has already been discussed eariler in the program, Set-Up Mode. The operating characteristics of this mode are Status Line displayed and only certain keys are functional. Refer to section 3.2, Operational Modes of the MDT 20 Video Display Terminal Service Manual as you read the following.

The MDT 20 Terminal provides nine Operational Modes. They are On-Line or Local Mode, Conversation or Block Mode, Protect Mode, Normal or Monitor Mode, Program Mode, and Set-Up Mode. These modes are designed to allow the terminal to perform a variety of functions. On-Line Mode allows the terminal to transmit, receive, and display data/commands via communication interface to a computer. The Local Mode, a off-line mode, allows the terminal to display and respond to keyboard data/commands but will not receive or transmit data/commands to the computer.

Conversation or Block Mode, allows the terminal to transmit data in one of two modes of operation. Conversation Mode transmits data immediately, character by character, as it is entered on the keyboard. Block Mode allows data from the keyboard to be displayed on the screen, corrected, formatted, then transmitted to the computer. Conversation Mode is the most commonly used mode for the MDT 20 Terminal.

The Protect Mode of operation allows specified characters on the display to be "protected" or reserved when performing block transmission, tabbing, or erase operations.

The Normal Mode enables the terminal to display all 96-displayable ASCII characters during receive operation, while the Monitor Mode causes all received data to be displayed as ASCII hexadecimal pairs.

Program Mode, when entered, allows the terminal to display the recognized control codes. Of the 32-ASCII standard control codes available for use, the MDT 20 Terminal uses only 14 codes. Table 3-1, Control Codes Utilized by the Morrow Terminal, located in section 3 of the MDT 20 Video Display Terminal Service Manual, lists the codes used.

Set-Up mode allows access to the firmware "switches" that control the operating characteristics of the MDT 20 Terminal. A Status Line, containing 10 four-bit "nibbles", is displayed and functions can be selected or changed by setting the bits to a "0" or "1".

KEYBOARD OPERATION

The MDT 20 Terminal uses a keyboard very similar to that of a standard office typewriter to enter data and perform control operations. The keyboard consists of the displayable 96-ASCII character set keys and various control or modifier keys. All keys will repeat automatically if held down, however, a 2-key lockout feature prevents a second keystroke from being typed before the first keystroke is released. Unlike the standard office typewriter, the MDT 20 Terminal keyboard has several types of keys that perform many different functions and operations.

There are Special Operation Keys that have unique effects on the MDT 20 Terminal. The Transmission Keys send unprotected data out the Main Port to computers and out the Auxiliary Port, usually to a printer. The keyboard has Cursor Control Keys to position the cursor, Edit Keys for use during word processing, and seven Function Keys used to transmit single control characters to be interpreted by the computer for particular operations. Refer to section 3.3 Keyboard Operation of the MDT 20 Video Display Terminal Service Manual and read section 3.3.2 thru 3.3.9.

DATA TRANSMISSION

Data transmission is Serial Asynchronous, ASCII character format of 1 start bit, 7 or 8 data bits, odd/even, or no parity bit and 1 or 2 stop bits. Keyboard transmission can take place in one of two modes, Conversation Mode (character by character) or Block Mode (line of data). Word structure and baud rate parameters are selected in the Set-Up Mode. Input and Output data is transmitted via the Main Port RS-232C interface and only output data is transmitted via the Auxiliary Port RS-232C interface. The MDT 20 Terminal features a X-ON/X-OFF function used to indicate to the computer when the terminal is busy and to suspend transmission to prevent data lost.

DISPLAY ATTRIBUTES

There are four Visual Attributes that can be assigned to any character displayed. They include: Blink, Underline, Reversed, and Reduced Intensity. The attributes that will be used are assigned singularly or in combination through a set-up function selection. The Field Attributes, which are "Set Write Protect" Command and Protect Mode, protect data from being overwritten, erased, cleared, or transmitted. Scrolling is also disabled when Protect Mode is set.

OPERATION

PRINT OPERATIONS

Transmission of data via the Auxiliary Port RS-232C interface is usually to a Serial RO (Read Only) printer. Print output transmission to the printer is performed using one of three commands: Page Print, Auxiliary Port with display, and Auxiliart Port without display. The Page Print command will cause the terminal to transmit specified data to the printer or other auxiliary device. Specified data is defind as unprotected data from cursor home position (upper left hand corner) to the cursor's present position. The protected data will be transmitted as spaces. When using the Auxiliary Port with display command, the terminal will display and act upon all received data as well as transmit the data out the Auxiliart Port to the printer. When using the Auxiliary Port without display command, data is not displayed on the terminal, but transmission out the Auxiliary Port to the printer is continued.

SELF-TEST

When the MDT 20 Terminal is powered On or reset (placing ON/OFF switch to off, waiting 10 seconds and placing switch to ON position) the terminal Self-Test will be executed. Self-Test will verify the integrity of the display memory, the program memory, non-volatile memory and the associated internal control logic. Upon completion of Self-Test the terminal will sound the audible alarm and the cursor will appear in the upper left corner of the screen.

This completes Module 3 Operation. If you feel comfortable with the material presented in this module, proceed to the Module Test located at the end of this module. If you require additional information, refer to the MDT 20 Video Display Terminal Service Manual.

MODULE TEST
OPERATION

Answer the following questions on a blank sheet of paper. Do not write in this manual. When you are finished, verify your answers with feedback sheet located in the back of this manual.

1. What operational mode is used to select or change functions and operation modes of the MDT 20 Terminal?

2. What mode of operation allows data to be transmitted immediately, character by character, to the computer?

3. What keys do not generate an output by themselves, but enhance the code generated by alphanumeric keys?

4. Name the two data transmission keys?

5. Name the terminal's Visual Attributes.

MODULE 4
SERVICE DOCUMENTATION

MODULE OVERVIEW

The purpose of this module is to familiarize you with the MDT 20 Video Display Terminal Service Manual and MDT20 Service Manual Supplement. This module will discuss the Service Manual's Table of Contents, Theory of Operation, Repair Data, and Troubleshooting sections of both Manuals.

PREREQUISITE MODULE

MODULE 4, OPERATION

MODULE OBJECTIVE

Using the MDT 20 Video Display Terminal Training Program and **REQUIRED RESOURCES**, answer, with 80% accuracy, a series of questions relating to the use of the service documentation to service and repair the MDT 20 Video Display Terminal.

ESTIMATED TIME TO COMPLETE

1.0 Hour

REQUIRED RESOURCES

MDT 20 VIDEO DISPLAY TERMINAL SERVICE MANUAL
MDT 20 SERVICE MANUAL SUPPLEMENT

SERVICE DOCUMENTATION

MDT 20 VIDEO DISPLAY TERMINAL SERVICE MANUAL

The MDT 20 Video Display Terminal Service Manual provides the necessary information to service the MDT 20 Video Display Terminal with support from the MDT 20 Service Manual Supplement. The contents of the Terminal Service Manual are divided into seven sections. Refer to the Table of Contents page of the Terminal Service Manual and observe the list of sections. Section I, General Description provides terminal specifications, introduction to the MDT 20 Terminal, and operational description of terminal components. Section II, Installation, contains safety requirements, site requirements, initial inspection and preparation, power ON/OFF, and care of the MDT 20 Terminal. Section III, Operation, and Section II, Installation, were discussed in Module 3, Operation, and Module 2, Installation, of this training program. Section IV, Theory of Operation, provides a functional description of the MDT 20 Terminal circuitry. The logical functions are first described at the system level, then individual circuit descriptions using detailed block diagrams are presented. Sections V, VI, VII, and Chapters 3, 4, and 6 of the Service Manual Supplement, describe removal / replacement /adjustment procedures, troubleshooting procedures, and parts list information.

Performing adjustment procedures, troubleshooting faults, and replacing faulty parts are the most common actions that you as a technican will have to perform on the MDT 20 Video Display Terminal. For that reason, this module will discuss the sections on troubleshooting, adjustments, and parts identification in depth. You are encouraged to review the complete manual and enter any comments or suggestions on the Comment Sheet located in the back of this program and forward to Service Education.

ADJUSTMENT PROCEDURES

Section V of the MDT 20 Video Display Terminal Service Manual and Chapter 3 of the Service Manual Supplement list all adjustment, alignment, removal, and replacement procedures. Refer to section V of the Terminal Service Manual and Chapter 3 of the Supplement Manual and observe the differences in their content. Chapter 3 of the Supplement Manual has only the CRT adjustment and alignment procedures, while Section V of the MDT 20 Terminal Service Manual has all other removal, replacement, and adjustment procedures. Perform the exercise below.

EXERCISE 4-1 ADJUSTMENT PROCEDURES

Answer the following questions using the MDT 20 Terminal Service Manual and Service Manual Supplement. Remember, write your answers on a separate sheet of paper. Do not write in this manual.

1.   What are the tolerances of the + 5 Volts, + 15 Volts, and -12 Volts produced by the Power Supply.

2.   Are the Power Supply voltage levels adjustable?

3.   What adjustments must be perform when aligning the Monitor Assembly?

4.   What section describes the MDT 20 Terminal's CPU?

(See page 4-5 for feedback to exercise)

PARTS IDENTIFICATION

The parts list located in section VII of the MDT 20 Terminal Service Manual lists all terminal components. The parts list was intended to support the replacement of parts at the transistor and resistor level. However, the Service Manual Supplement provides a revised parts list. The parts listed in Chapter 4 of the Service Manual Supplement are of the major parts type. These parts include CRT, Yoke, Main Logic PWB, Monitor Control PWB, LED PWB, Power Transformer, and Control Switches. All parts listed in Chapter 4 have two part numbers, a Xerox part number and a MDT 20 part number. The parts listed in the Service Manual Supplement are the items that will be Field Replaceable.

As an exercise in using the parts section of both manuals, answer the following questions using the MDT 20 Video Display Terminal Service Manual and MDT 20 Service Manual Supplement. Remember, write your answers on a separate sheet of paper. Do not write in this manual.

EXERCISE 4-2 PARTS IDENTIFICATION

1.   What is the Xerox part number of the Power Transformer?

2.   What is the MDT 20 part number of the Monitor Control PWB?

3.   What is the part number of Flyback Transformer?

(See page 4-5 for feedback to exercise)

TROUBLESHOOTING

Section V and Chapter 6 of the MDT 20 Terminal Service Manual and Supplement Manual contains the troubleshooting procedures. The procedures provide step by step instructions to assist you in solving faults within the Terminal. The troubleshooting section will be covered more in depth in Module 5, Troubleshooting.

This completes Module 4 Service Documentation. If you feel comfortable with the material presented in this module, proceed to the Module Test located at the end of this module. If you require additional information, refer to the MDT 20 Video Display Terminal Service Manual.

EXERCISE 4 -1 ADJUSTMENT PROCEDURES

Feedback answers:

1.	+4.75 to +5.25 volts, +14.25 to +15.75 volts, and-11.40 to -12.60 volts

2.	No

3.	Adjust Brightness, Focus, Vertical Height, Horizontal Width, and check/adjust Horizontal Linearity.

4.	Section III

EXERCISE 4-2 PARTS IDENTIFICATION

Feedback answers:

1.	105N00123

2.	916008-001

3.	916027

MODULE TEST
SERVICE DOCUMENTATION

Answer the following questions on a blank sheet of paper. Do not write in this manual. When you are finished, verify your answers with feedback sheet located in the back of this manual.

1. Which section of the MDT 20 Video Display Service Manual contains the Horizontal Width adjustment?

2. What are the site requirements for installing the MDT 20 Video Display Terminal?

3. Is the Power Supply PWB an field replaceable, and if so, what is the Xerox part number?

4. Where would you find removal procedures for the Rear Cover of the display (manual and section) ?

MODULE 5
TROUBLESHOOTING

MODULE OVERVIEW

The purpose of this module is to familiarize you with the troubleshooting procedures of the MDT 20 Video Display Terminal Service Manual and Service Manual Supplement.

PREREQUISITE MODULE

MODULE 4, SERVICE DOCUMENTATION

MODULE OBJECTIVE

Using the MDT 20 Video Display Terminal Training Program and **REQUIRED RESOURCES**, answer, with 80% accuracy, a series of questions relating to the troubleshooting procedures used to repair the MDT 20 Video Display Terminal.

ESTIMATED TIME TO COMPLETE

1.0 Hour

REQUIRED RESOURCES

MDT 20 VIDEO DISPLAY TERMINAL SERVICE MANUAL
MDT 20 SERVICE MANUAL SUPPLEMENT

TROUBLESHOOTING

TROUBLESHOOTING

Section V of the MDT 20 Video Display Service Manual and Chapter 6 of the MDT 20 Service Manual Supplement contain all troubleshooting procedures for the MDT 20 Terminal. However, you may be referred to sections five and three of both manuals to check or perform an adjustment to correct a problem, or to remove/replace a part. Module 5 Troubleshooting will discuss only section S.12 of the Service Manual and Chapter 6 of the Supplement Manual.

MDT 20 VIDEO DISPLAY SERVICE MANUAL FAILURE ANALYSIS

Section 5.12 contains the troubleshooting procedures required to diagnose and repair faults in the MDT 20 Terminal. Seven steps are used to determine the correct equipment, whether the terminal was manufactured as a standard terminal or special terminal, verify customer problem, duplicate the problem, and isolate and repair the failure. Table 5-11 provides a Sympton/Possible Cause/Action Taken guide for repair of failures within the terminal. Chapter 6 of the Service Manual Supplement was designed to support Table S-11 by providing level 1 and level 2 troubleshooting procedures consistent with troubleshooting procedures of other training programs. Review Table S-11 at this time.

SERVICE MANUAL SUPPLEMENT FORMAT

Refer to Chapter 6 of the Supplement Manual. The format of this section is quite different from the format of Section V in the Terminal Service Manual. Chapter 6 is divided into five sections. The five sections are: Introduction to MDT 20 Terminal Troubleshooting, Level 1 Checkout Explanation, Level 2 Check Chart Explanation, Level 1 Checkout, and Level 2 Check Chart procedures.

Introduction to Troubleshooting, Level 1 Checkout and Level 2 Check Chart Explanation sections contain the service strategy, telephone numbers for the Dallas Service Center Technical Support Hot Line, explanations, and samples of the Level 1 Checkout Procedure and Level 2 Check Chart.

Level 1 Checkout procedures perform the basic checkout, and if appropriate, the diagnostic procedures to eliminate obvious problems. When given an incorrect indication, the procedures will direct you to the proper level 2 check chart. An example of indications checked at this level would be LED lit, AC power cable connected to outlet, and video source connected to display.

The Level 2 Check Chart procedures are divided into four major checks starting with 6.01 Cursor Not Displayed, 6.02 Keyboard Not Responding, 6.03 Display Quality, 6.4 Interface Fault Isolation, 6.5 AC/DC Power Fault Isolation, 6.6 No Video (Black Screen), and ending with 6.07 Horizontal/Vertical Sync Check.

Using Level 1 and 2 troubleshooting procedures of the MDT 20 Service Manual Supplement, perform the following exercise.

EXERCISE 5-1 TROUBLESHOOTING FAULTS

1.   When step 3, under Diagnostics Sequence, is performed, only the cursor appears on the screen.
    A.   What Level 2 Access Check Chart is indicated?

    Refer to the Level 2 Check Chart indicated in step 3.
    B.   What repair action is indicated to correct the indication of step 3?

2.   When step 4, under Diagnostics Sequence, is performed, several Xs appear on the screen, but display quality is not good.
    A.   What Level 2 Access Check Chart is indicated?

    Refer to the Level 2 Check Chart indicated in step 4 b. and read all procedures and indications ·
    listed in this Check Chart.
    B.   What repair action is indicated when the resistance of the Contrast Control is 200K Ohms?
    C.   What adjustment or adjustments are performed when step 5 of this Level 2 Check Chart indication is incorrect?

(See page 5-4 for feedback to exercise)

As in all troubleshooting procedures a certain amount of logical deduction is expected of the technician. The information provided in the Training Manual, Service Manual,and Suplement Manual will diagnose 98% of the problems.

This completes Module 5 Troubleshooting. If you feel comfortable with the material presented in this module, proceed to the Module Test located at the end of this module. If you require additional information, refer to the MDT 20 Video Display Terminal Service Manual or Service Manual Supplement.

EXERCISE 5-1 TROUBLESHOOTING FAULTS

Feedback answers:

1.   A. 6.1

     B. Replace Logic PWB

2.   A. 6.3

     B. Replace Contrast Control

     C. Horizontal Width and Horizontal Linearity

MODULE TEST
TROUBLESHOOTING

Answer the following questions on a blank sheet of paper. Do not write in this manual. When you are finished, verify your answers with the feedback sheet located in the back of this manual.

1. The Diagnostics Sequence is performed at what level of troubleshooting?

2. Why should the terminal's serial number be checked and verified before troubleshooting a fault?

3. Table 5-11 recommends what action be taken for no horizontal or vertical deflection?

4. When using the Service Manual Supplement to troubleshoot a Display Quality problem, what section provides troubleshooting procedures?

5. What are the indications for step 3 in Level 1 Checkout?

MODULE TEST
FEEDBACK SHEET

MODULE 1 INTRODUCTION and SPECIFICATIONS

1. States exactly what must be done, what may be used while doing it, and how you will be measured in order to demonstrate your competence.
2. Module Prerequisites
3. Additional References
4. Conversation Mode and Block Mode
5. 12 inch diagonal, P31 Green Phosphor
6. Main Logic PWB, Monitor Control PWB, Regulated Power Supply, Transformer Assembly, CRT and associated circuit

MODULE 2 INSTALLATION

1. No special mounting provisions required
2. Set-Up Mode is entered, display scrolls up one line, and Status Line is displayed. Press the Set-Up key a second time and Set-Up Mode is exited, display scrolls down one line, and previous data is displayed.
3. Volatile and Non-Volatile Memory
4. Auxiliary Port
5. Over the " = " next to Baud
6. Save key and Set-Up key

MODULE 3 OPERATION

1. Set-Up Mode
2. Conversation Mode
3. SHIFT, CAP LOCK, and CTRL keys
4. ENTER and PRINT keys
5. Blink, Underline, Reduce, and Reverse

MODULE TEST
FEEDBACK SHEET CONT.

MODULE 4 SERVICE DOCUMENTATION

1.   Section 5.7 CRT Logic Board/Monitor Board removal/replacement
2.   Normal office environment, must be weather protected with an ambient temperature range of 41° F to 104° F, and relative humidity of not greater than 85%.
3.   Yes, 105N00122
4.   Service Manual, section 5.2

MODULE 5 TROUBLESHOOTING

1.   Level 1 Checkout
2.   To eliminate the possibility of working on the wrong terminal
3.   Replace Main Logic Board, replace CRT Logic Board
4.   6.03 Display Quality
5.   After 10 seconds, buzzer sounds and cursor appears in the upper left corner of the screen

PUBLICATION COMMENT SHEET

Please use this comment sheet to assist with identification of errors or needed improvements in this publication. For specific errors, include a copy of the page that contains the error.

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PUBLICATION NAME   MDT 20 VIDEO DISPLAY TERMINAL TRAINING MANUAL

PUBLICATION NUMBER   SBXADT010

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